

Midwest Engineer

LEAVING THE ENGINEERING PROFESSION



1956-57 WSE PRESIDENT GEORGE L. JACKSON
PROGRESS MUST BE CREATED—PAGE THREE

JUNE, 1956

No. 1

MODERN STOKER-FIRED BOILERS

Despite the relatively wide extent to which oil — and gas — have come into use for firing industrial boilers, the fact remains that coal continues to be the most economical fuel available in many areas.

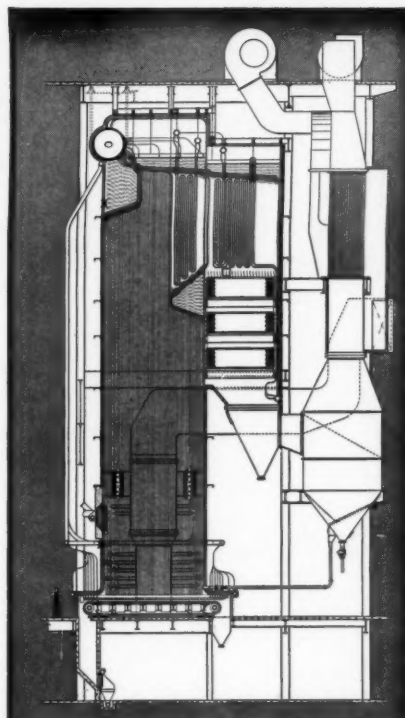
Moreover many potential coal users are unaware of the tremendous improvements that have been made in recent years in the design and general effectiveness of mechanical stokers. Here at Combustion virtually the entire stoker line has had extensive design changes, all directed at improved performance. But overall performance is tied in inescapably with boiler performance. At Combustion you have the important advantage of dealing with a leading boiler manufacturer that also offers the most complete line of stokers available anywhere. You are assured, therefore, of a completely coordinated design comprising stoker, boiler, furnace and — if desired — heat recovery equipment and/or auxiliaries, all engineered specifically for your particular requirements.

Displayed below are three — of the many — C-E stoker-fired boiler designs which, collectively, are suitable for any coal-firing conditions.

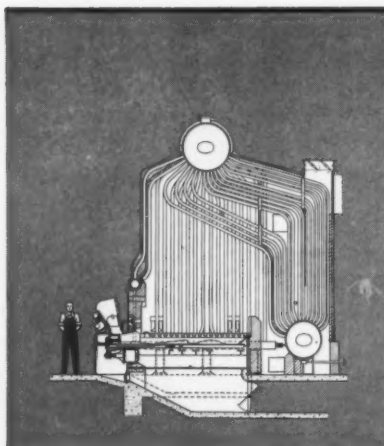
At the right is illustrated the latest — and largest — example of the C-E Bark-burning Unit, a design pioneered by Combustion and now widely used for burning bark, hogged-wood and other waste wood fuels.

So — when you are in the market for coal or other solid-fuel-burning units it will certainly be to your advantage to find out what Combustion Engineering has to offer. Our engineers will be glad to discuss your needs with you or your consultants.

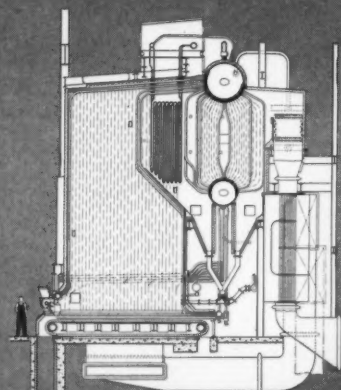
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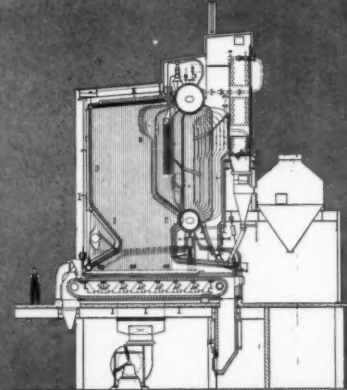
C-E BARK-BURNING UNIT for a paper company. This is a very large unit; capacity — 450,000 lb steam per hr, operating pressure — 1335 psig; total steam temperature — 958 F. It is designed to burn bark, natural gas, oil or any combination thereof. These units are in service for capacities as low as 20,000 lb of steam per hr.



THIS C-E VERTICAL-UNIT BOILER, TYPE VU-10 fired by a C-E Underfeed Stoker, Type E is for a dairy. Capacity is 30,000 lb steam per hr at 150 psig. VU-10 Boilers are available for capacities from 10,000 to 60,000 lb of steam per hr. They are often equipped with C-E Spreader Stokers, dump grate type.



ONE OF TWO DUPLICATE UNITS for a chemical company comprising C-E Vertical-Unit Boilers, Type VU-40 fired by C-E Spreader Stokers, continuous discharge type. These are baffleless boilers designed for a capacity of 150,000 lb steam per hr at 900 psig and 808 F. Coal is Eastern Bituminous.



THIS C-E UNIT is being installed for a soap company. It comprises a C-E Vertical-Unit Boiler, Type VU-50 fired by a C-E Traveling Grate Stoker. Coal used is Midwest Bituminous. This boiler is designed for a capacity of 100,000 lb steam per hr at 850 psig and 585 F. It is an outdoor type unit.

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COVER STORY

George L. Jackson, the new president of the Western Society of Engineers, is presented on the cover of this issue. Mr. Jackson is chief engineer of the Illinois State Toll Highway Commission. Previously he worked for the Sanitary District of Chicago, the City of Chicago, and the Illinois Division of Highways.

A member of the Society from 1928, Mr. Jackson served as chairman of the Hydraulic, Sanitary, and Municipal Section, and the Awards, Admissions, and Development committees. He is presently a member of the Traffic Engineering and City Planning Section.

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Progress Must Be Created

By Robert T. DeVore

It always has seemed to me that an audience is entitled to know, in all fairness, what kind of talk it may expect to listen to. I can fulfill that requirement best by telling you the kind of talk I shall *not* make. Let me say, first, that nothing I shall say will be intended, at least, to be inspirational. I shall not attempt to take you up to the mountain top and show you a promised land. Moreover, I shall not try to be funny. At the very best, this speech may be said to contain about a joke and a half.

This, in the main, will be a serious talk, one which may be characterized, I believe, by a story told many years ago about a professor of law at the University of Michigan. The old man was in the habit of telling his students, at least once every term, something like this:

"Gentlemen, when the facts in a law case are on your side, hammer them into the jury. But when the law is on your side, hammer it into the judge."

One day a student, as might have been expected, asked what he was to do when he had neither fact nor law on his side.

"Young man," the professor replied, "There is then only one thing for you to do: Hammer the table."

Gentlemen, I am not going to hammer the table. I think I have the facts on my side. This will be a factual talk about research and industry and their relationship to you and me.

Should you be asking yourselves why I chose to talk to you today on the subject, "Progress Must Be Created," let me say that I began to suspect some time ago that Americans may be beginning to expect too much of what we might call the miracles of our progress—such things as television, the automobile, or the airplane. Let me illustrate what I mean, and from your own experience you will be able to draw many similar examples.

A few weeks ago, I stood in an airport in New York City and heard a friend of

mine mercilessly excoriate the airline ticket agent because his plane was 45 minutes late. Not 45 minutes late from Washington, or Baltimore, to New York, but 45 minutes late from Los Angeles. This man felt so badly about losing 45 minutes on a trip across the entire North American continent, that he took another 15 minutes to tell the ticket agent just how badly he did feel. Now what cause for anger could there possibly be in the loss of 45 minutes on a journey of 3,000 miles, in the scheduled time of about nine hours, a journey that could not have been made in our own lifetime in less than several days, and that in the time of our great-grandfathers would have taken months by oxcart or Conestoga wagon?

The impatience of my friend caused me to do some pretty hard thinking about a simple, but tremendous, concept of progress as we have come to understand it in these United States. About the first thing that occurred to me, as I think it must occur to you, is that we may be, indeed, the first nation in the history of the world in which miracles of progress have become normal, everyday, and expected.

But one may wonder if we are not beginning to take progress for granted, if my friend's impatience may not suggest that we may be falling into a national state of mind which assumes that progress just happens and that you don't have to do anything to stimulate or encourage it. If that should be the case, you will agree, we may be headed for trouble.

When you buy a set of tires today and the salesman tells us they'll run for 40,000 miles, we expect them to run that far, and we're going to be pretty unhappy if we only get 39,000 miles. We forget that, only yesterday, 5,000 miles for a set of tires was good. And when I was a boy, driving up into northern Michigan with my family for our vacation, we thought it a miracle, indeed, if we were able to drive an entire day without a blowout. Why, we carried as many tires inside the car as we had on

the road. We were practically a tire accessory shop on wheels. And with good reason.

Our wives today are apt, are they not, to give the appliance salesman a lady-like blistering of the ears the first time the automatic washer jams, forgetting that their mothers did the washing with boiler and scrub board. You and I, for that matter, are apt to take a pretty dim view of modern living when the ice cubes stick in the tray, forgetting that our grandfathers, and even our fathers, cut and hauled their ice from the pond in winter. We grumble when we have to get up in the middle of the night to relight the oil burner, forgetting that in the garage, or tool shed, hangs a bucksaw to remind us, if we would let it, of yesterday's woodpile.

We've become used to progress in America. We want a lot. We get a lot. And we're annoyed when our miracles of progress don't perform quite as miraculously as we think they should. In a way, that's good. In a way, our great expectations pay tribute to the efficiency of our economy and the high value we place upon individual responsibility for progress. But the danger is, in taking progress for granted, we may lose touch with the very sources of our national prosperity and strength. When we, as a nation, come to believe that our position in the world today is an accident of time, climate, and natural resources, at that moment the decline of America, gentlemen, will be well advanced.

I am talking about the material aspects of progress. But all progress basically is an accomplishment of the spirit. I cannot agree with those who hold that material abundance necessarily brings spiritual decline. It seems to me that this nation is becoming stronger spiritually. The recent increase in church memberships is but one sign of the direction we are taking. We need not apologize for our material abundance. We must know we created it—with the help of Providence—and never forget how.

I am talking, specifically, about prog-

Mr. DeVore, Extension Division, Public Relations Department, E. I. du Pont de Nemours & Company, presented this talk before the Western Society of Engineers in Chicago on Jan. 24, 1956.

ress in our national stability to produce more and more of the things of comfort and necessity which are the real basis of wealth. We have only what we produce; nothing more. A great American once said, and I think you will be able to identify him from his words:

"Only the productive can be strong; only the strong can be free."

Those words are just as true today as they were when they were first uttered during a Presidential campaign some 15 years ago. And it is true that only the productive have the answer to a problem as old as mankind: the problem of providing a higher standard of living for all people.

The productivity of America is the result of genius for applying scientific knowledge to problems of production under the stimulating influence of our incentive economy. We call the use of science in industry by the word "technology." But I like to think of technology somewhat more broadly, as that system, more highly developed in this country than any other in the world, under which business management, supported by the invested money of many people, forms men and women into industrial teams and coordinates their efforts. These are men and women of all sort of capacities and skills: in the sciences, in engineering, in construction; in plant operation and sales and in management.

Working together, these people, these teams of technologists, translate the ideas of research scientists into new products and better ways to make old products. They create new industries, new jobs, new opportunities for existing businesses, new wealth for the nation.

Now it hardly will be news to this audience that to create a new business from a research discovery takes a lot of doing. In the chemical industry, from ten to eleven years usually pass between the initial discovery in the laboratory and the conversion of that discovery into a new plant or a useful new product. Moreover, in the chemical industry, out of 20 research projects, only one, on the average, ever reaches commercial maturity. Nineteen out of 20 chemical industry research projects have to be regarded as commercial failures. Now, I know that from the standpoint of the scientist, the discovery of new knowledge never can be regarded as a failure. But the business man has to look at

things a little differently. He may be perfectly willing to pay for 20 research projects to develop a new product or process, but he can scarcely be expected to regard the nineteen others as commercial successes. So to bring forth a new business from a research discovery takes a lot of time and patience and the courage to persevere. It also takes something called money. As a matter of fact, the painful process of giving birth to a new business from laboratory to operating plant often requires money resources in almost unbelievable amounts.

Let me ask, for example, if any one of you would dream of paying 80 million dollars for this? (Holding up handful of "Dacron" polyester fiber.) It looks like a bit of clean-up cotton waste, doesn't it. It isn't cotton waste, of course. It's our newest synthetic fiber. We call it "Dacron" polyester fiber. Some people have called it man-made wool. And I would not dare tell you what some of the wool people have called it. As a matter of fact, this country, in normal times, has to import wool. In times of crisis, as during the Korean war, when wool imports are cut off, it's nice to have some man-made wool around. Furthermore, as all of you know, "Dacron" frequently is blended with wool in suiting fabrics, as it is blended with cotton for such things as men's shirts. But it is not my intention today to extol the virtues of "Dacron."

A moment ago, I said something about 80 million dollars, and you may be wondering why. Let me tell you: we spent 80 million dollars before we were able to make a pound of "Dacron" in a commercial plant.

The story of "Dacron" is one of the most dramatic of our entire research experience. But it does not end with the story of the fiber. That's because of the imagination of one of those dedicated chemists to whom we all owe so much. One day, this scientist saw "Dacron" polyester fiber at that stage of the process in which it is liquid in form. He wondered if it would not be possible to cast "Dacron," in liquid form, into a film, much as cellophane is made. Well, about four years and five million dollars later he proved he was right. Liquid "Dacron" could be made into a film which looks like cellophane. (Showing "Mylar" polyester film.)

Let me assure you, however, that any resemblance between this film and cellophane is completely superficial. (After making determined effort to tear film.) For one thing, as you may gather, "Mylar" is very strong. Now, you may have among you a young fellow strong enough to tear one of those big city phone books in two. And maybe he could tear this film. But, frankly, I have my doubts because "Mylar" has a tensile strength of 23,500 pounds per square inch. It's the strongest of the commercial



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films. Strength like that, obviously, is an advantage in such things as industrial tape, sound recording tape, and motion picture film base.

"Mylar," moreover, is one of the best electrical insulating materials we know. You take a film of "Mylar" like this, just one-thousandth of an inch thick, and you put it between two electrical conduits. Then you raise the voltage to one thousand volts, two thousand, three thousand, four thousand volts. Only when you get in the vicinity of five thousand volts does the electric current break through one-thousandth of an inch of "Mylar." Electrical insulating efficiency such as that means that you don't need as much insulating material in a given application as you did before. Now, using "Mylar," you can design electric motors and other electrical components more compactly, smaller, and lighter. The modern airplane, as you know uses many electrical components. Weight and space saved in an airplane, of course, add to its speed, range and load-carrying capacity.

It will interest you to know that "Mylar" polyester film and "Dacron" polyester fiber are identical, except in form. Chemically they are the same. The molecular structure is the same. The only difference is that one has been made into a fiber, the other into a film.

"Mylar" is manufactured by the Du Pont Company only as a clear film. I mention that because what I am going to talk about now, gentlemen, has not resulted directly from Du Pont research, but rather from the creativeness of literally scores of Du Pont customers, almost all of them small businesses. Sometimes in industry, progress, in the shape of a new product, sparks progress, in the shape of many other new products, almost like a chain reaction in an atomic pile. And something very much like that has been happening in the case of "Mylar." Virtually every small enterpriser who has worked with "Mylar" has come up with a different idea of how to use it.

One man, for example, saw "Mylar" not as a clear film but a light base for an even lighter film of sparkling metal. (Showing metalized "Mylar.") He took clear "Mylar" film, one two-thousandths of an inch thick, and, using a vacuum process, caused it to be coated, very lightly, with aluminum. The metal on this film is so thin that you actually can

see through it. (Holding over eyes.) In case any of you doubt this, will some one please hold up his hand. (Looking through film, locating person with hand up in audience.) The textile industry is using metalized "Mylar" in the manufacture of metallic yarns. The automobile industry is beginning to use it as a replacement for metal trim in the interior of cars. The upholstery industry is using metalized "Mylar" in many forms. This is metalized "Mylar" (Showing vinyl-backed material) backed with vinyl plastic sheeting and colored by the addition of color to the adhesive. Many of the '55 cars today have material of this sort in the kick panels at the bottom of doors and other places where the upholstery has to withstand severe service. Other car manufacturers are using metalized "Mylar," without color, such as this, (Showing it) in the interior trim.

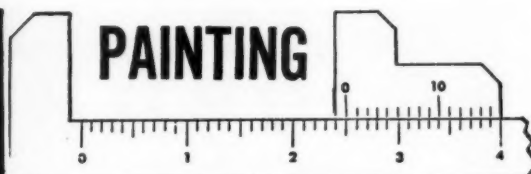
One of Du Pont's customers for "Mylar" is a surgical dressing manufacturer. (Showing surgical dressing, backed with the film.) This is a dressing of absorbent cotton, backed with a very thin coating of "Mylar." Now, at one time or another, each of you has suffered a cut of some kind. And you know what happens when you change the dressing. The wound has begun to heal, and, in taking off the dressing, you damage the healing tissue because some of it has stuck to the dressing. (Demonstrating.)

The "Mylar" prevents the adhesion. Now you can change the dressing without disturbing the healing processes. And because the film of "Mylar" has been perforated with many tiny holes, blood has been permitted to pass through to the absorbent cotton.

Had I been able to carry with me all of the new applications for "Mylar" both experimental and commercially available, we would have had enough to cover about half this wall. I mention that because we have been making "Mylar" in a commercial plant for a little more than a year. Now, I think you all will agree that something has happened which is pretty important to all of us. That something began with the discovery of a new fiber in the research laboratories of a company big enough to have the kind of resources it takes to spend 80 million dollars before a pound of the fiber could be made in a commercial plant. Then this development, of itself significant, was given greater dimension by the imagination of a chemist who transformed a new fiber into a new film. After that, creative processes in a score or more of businesses were turned loose, and you have seen a fraction of the results. Progress does indeed spark progress, sometimes like an atomic chain reaction, and this almost breathtaking progression of event, repeated many times in the whole of American

(Continued on Page 18)

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Company Presidents' Chief Worry

Company presidents worry more about developing a top management team than on any other business problem, Lyle M. Spencer, president of Science Research Associates, on May 2 told members of the Manufacturers' Association of Racine, Wisconsin, at an Association luncheon.

Spencer, who talked on the subject "Better Ways of Building Top Management," said, "The key difference between owning a company and running a profitable business lies largely in the success a president achieves in organizing an effective, functioning team of top executives. Finding, training, and motivating the key executives, through whom a president must accomplish his work, is the thorniest and longest-lasting problem he faces."

Spencer listed this as one of the key findings from a research study conducted by the Young Presidents' Organization, a group formed six years ago and comprised of men and women who became presidents of their concerns before reaching the age of 40. The club, limited to chief executives whose companies employ 50 or more workers, and whose annual sales volume is one million dollars or more, has over 1,000 members throughout the United States. Last year YPO companies were responsible for more than \$6.9 billion worth of business.

Spencer said that a rule-of-thumb method to enable company presidents to organize and motivate their key executives more effectively has been developed from the findings. He continued, "as a result of the survey, four outstanding characteristics of a good executive emerged from the source material. They are:

"1. The members of a good executive team possess remarkable flexibility. Regardless of their training and experience within the company, they are receptive to new ideas, able to adapt themselves quickly to changing conditions, and can withstand setbacks without losing their drive and enthusiasm.

"2. A good executive team has depth. The temporary absence of one member of the team limits the organization and perhaps decreases its efficiency, but it does not leave the company paralyzed.

"3. The members of a good executive team each build their own efficient division of the company with a minimum of routine supervision. The executive team members and their divisions are in a state of healthy rivalry with each other.

"4. The executive team functions by balancing and controlling two impulses which are in essential conflict with each other. On the one hand, there is a desire for maintaining, improving, and continuing the status quo, for preserving

the business and for correcting the things that hamper the present functions of the business. The second impulse which drives the executive team is the impulse toward growth, toward developing new products, new markets, new kinds of business enterprises more profitable than the ones the company already has."

Spencer also said that the executive teams of most companies are "surprisingly small. They usually include only three or four persons besides the president; an administrator, who serves as the president's alter ego and keeps the company's day-to-day operations running smoothly; a sales manager; a production chief; and a financial officer who manages the company's capital. Other business posts rarely achieve top ranking in a company's inner circles."

If all the attributes and statistics were put together to form a composite key executive, Spencer said the "average" would look something like this:

"1. He is currently holding a job that carries more responsibility than any job he has previously held.

"2. More likely than not, he has come up from the ranks within the company.

"3. He has less education than his president and he feels defensive about it.

"4. He is older than the president although he has held his present post for only three years.

"5. Planning ahead, he looks forward to making a long-time career in his present company. Although he knows the chances of his becoming president are small, he is ambitious to expand the scope of his present job by helping his company to grow.

"6. His present salary is about \$13,200 yearly. Although he has succeeded in the business world faster than he expected to, he expects to earn a materially greater amount in the future, and the chances are one in three that he is actively dissatisfied with his present income."

Spencer also said that the basic reward that the executive receives for his good performance on the job is his own feeling of personal satisfaction and his feeling that he has gained the esteem and respect of his fellow executives, the president, and his subordinates. Most executives crave these satisfying experiences of accomplishment. They need to respect themselves and have the respect

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of their fellow workers. Most key executives have a sneaking suspicion that they are really not quite good enough for their present jobs. Their continuing need to reassure themselves about their own competence as a major factor in maintaining the drives that produce business accomplishment."

Spencer said that most YPO presidents surveyed were dissatisfied with the quality and performance of the management team. This is usually due less to the actual quality of their executives rather than to the restless desire of most presidents to find more ways of improving and enlarging their companies, he said.

He also said the most serious criticism executives make of their president "is his inability to voice his deepest concerns about really important company or personal matters, although he expects his executives to act as though they understand what these concerns are."

A thumbnail description of the average YPO'er would include the following facts:

The average net worth of the presidents was \$278,000—an increase of \$8,000 over last year. Eighty of the 1,000 members are millionaires.

The typical annual income is about \$41,000, of which about 85 per cent is earned at their job.

The average YPO'er carries about \$116,000 in insurance.

Eighty per cent of the members are active in outside activities. Two-thirds actively participate in civic activities, and almost one-half are active in trade associations.

YPO'ers are active in government. Nineteen per cent hold an elective or an appointive office.

Meat and Chemistry

More meat on American tables means bigger sales for chemical companies, and meat-eating is definitely on the rise, says *Chemical Week*. In '55, about 700,000 pounds of antibiotics went into animal feed supplements, plus large amounts of minerals and hormones, to supply more and better meat. Per capita meat consumption has jumped about 23 per cent since the early '30s and about 13 per cent in the past five years. An average of 160 pounds of meat were consumed per person in this country last year.

MIT-Harvard Plan Synchrotron

The Massachusetts Institute of Technology and Harvard University will jointly design, build, and operate in Cambridge a six billion volt electron synchrotron to be called the Cambridge Electron Accelerator.

It will be devoted to basic research in the structure of matter. Its purpose is to push back the frontiers of man's knowledge of the particles within the nucleus of the atom. The work of the accelerator will be of general and fundamental scientific interest.

The new "atom smasher" will be built at a cost of about \$6.5 million with funds provided by the U.S. Atomic Energy Commission.

Following formal approval of an agreement between the Executive Committee of the Corporation of M.I.T. and the Corporation of Harvard University, the two institutions have formed a joint management committee to operate the project. Work on the detailed plans will begin immediately, and the machine will be completed in about four years. Dr. M. Stanley Livingston, professor of physics at M.I.T., will be the first director.

Design studies for a large electron accelerator have been underway by a group from the Physics departments at Harvard and M. I. T. for the past two years, supported in part by a joint program of the Office of Naval Research

and the Atomic Energy Commission. On the basis of these studies, present plans for the Cambridge Electron Accelerator call for a machine which will accelerate electrons around a circular path 236 feet in diameter. It will be installed in a circular underground trench building with adjacent laboratories for experimental work. The tentatively selected site is on Harvard property adjacent to its Cyclotron.

Electrons entering the circular path at low energy will be accelerated as they whirl around it by 16 radiofrequency circuits, each requiring power equivalent to a television transmitter. Forty-eight laminated magnets, each measuring 2 by 2 by 11 feet, will guide the electrons around the orbit. These magnets will provide the strong focusing forces required to hold the particles in their path.

The electrons will emerge with the highest electron energy ever produced in any laboratory. They will move at very nearly the velocity of light; indeed, they will be the fastest particles ever accelerated by man. An electron moving at this speed, starting around the world at the same time as a beam of light, would be only five inches behind when the beam returned to its starting point. The increase in the electrons' energy in the machine will be accompanied—in ac-

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cordance with the Einstein law for the equivalence of mass and energy—by a very large increase of mass; the emerging accelerated electrons will have a mass about 12,000 times that of the entering electrons.

These high-energy electrons will emerge in pulses or bursts, at the rate of about thirty bursts per second. Traveling in this concentrated beam, the electrons will be directed at a small target in a shielded enclosure.

"These electrons with 6 billion electron volts of energy," says Dr. Livingston, "will be used as missiles to produce nuclear disintegrations or to generate high-energy X-rays used in turn to break apart nuclei. We expect these high-energy electrons to produce heavy mesons, negative protons, and other new unstable particles with energies higher than can be obtained in any machines now in use. They should appear in numbers sufficient for important new experiments."

The final design of the new machine will be carried out by a staff of about 30 scientists and engineers, including many members of the faculty and advanced students at both M.I.T. and Harvard. When completed the machine will be available to all faculty members and research students at both institutions who wish to make use of its high-energy

particles. In addition, its facilities will be open to qualified research workers from other New England educational institutions.

Commenting on the cooperative nature of the undertaking, Dr. Stratton said, "Physicists at Harvard and M.I.T. have often worked together in the past, and we look forward to the most friendly and stimulating scientific collaboration in this new enterprise. The project will illustrate the importance of the broadest collaboration between experts in all fields in such a major undertaking."

The new machine will be devoted to fundamental research in particle physics, according to Dr. Ramsey. "It should make possible," he said, "important new knowledge of the structure of the individual particles which combine to form the nuclei of atoms."

"We hope to study," Dr. Ramsey continued, "the structure of individual protons and neutrons and the fundamental forces underlying this structure. In addition, we expect to produce new unstable forms of matter which have been observed in cosmic rays."

"Fundamental research of this kind," Dr. Purcell said in commenting on the plans for the new machine, "promises a further extension of our knowledge of the complex particles which form the nuclei or cores of all atoms."

Many graduate students and some advanced undergraduates—as well as faculty members—are expected to use the machine. "In every way," said Dr. Ramsey, "this new machine will enrich the educational experiences of students in physics at both M.I.T. and Harvard. This kind of training in the techniques of modern high-energy physics is one of the nation's critical needs."

Though the machine to be built in Cambridge will be, so far as is known, the highest energy accelerator of electrons, it will not be as powerful as the proton synchrotron now being built at the Brookhaven National Laboratory (Upton, Long Island, New York), which will accelerate protons to energies of 25 to 30 billion electron volts.

One-billion-volt accelerators of electrons are in operation at Cornell University (Ithaca, New York) and the California Institute of Technology.

International Nickel Makes Grant-in-Aid

A grant-in-aid for 1956-57 has been made by The International Nickel Company, Inc., to Boston College, Chestnut Hill, Mass., to permit continuation of research on oxygen reduction overvoltage of metals, the Very Reverend Joseph R. N. Maxwell, S. J., president of the college, has announced. The research is being conducted under the direction of Dr. Andre J. deBethune, professor of chemistry, with the assistance of Professor Truman S. Licht and Anthony Pawlowski. The latter is completing his master of science thesis and plans to pursue studies for his doctorate of philosophy in the fall, when Alexander J. Fekete of Fairfield, Connecticut, will replace him in work on this project.

This is the second grant-in-aid made to Boston College by the International Nickel Company for this purpose, and represents an effort to stimulate and support fundamental research by university scientific workers in their chosen fields.

Diplomacy

Dog candy to improve canine relations of meter readers is a new standard item on utility expense accounts, says *Electrical World*. Justification is measured in fewer dog bites per man.

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Cement Association to Build Labs.

G. Donald Kennedy, president of the Portland Cement Association has announced that the Association will construct two new laboratory buildings at its Research and Development Laboratories in Skokie, Ill. Estimated to cost \$1.8 million with their equipment, the buildings will provide for the Association's expanded research program on concrete structures and the fire resistance of concrete.

The buildings are being designed by Dunlap and Esgar, Inc., of Chicago in cooperation with the Portland Cement Association staff. Completion is scheduled for 1957.

The Structural Development Laboratory will be 56x176 feet in plan, and the Fire Research Center 56x220 feet, with a two-story 24x132-foot wing on one side. The main portion of each building will be a single large room 40 feet high. Offices will be located in an end bay of the Structural Development Laboratory and in the wing of the Fire Research Center.

Identical precast structural members will be used for the main portions of both buildings. Frames will be of conventional reinforced concrete, but the beams will utilize high-strength steel reinforcing bars. The beams were designed by the ultimate strength method using 60,000 psi for ultimate steel stress. Wall panels will be of tilt-up construction with decorative designs cast in the concrete. The roofs will be of precast concrete units.

Dr. A. Allan Bates, vice-president for research and development of the as-

sociation, stated that the buildings have been made necessary by significant advances in concrete technology and structural design. American engineers are making great strides in use of types of concrete construction relatively new to this country, Bates pointed out. The new laboratories will be devoted to supplying through the association's field engineering organization to designers and builders the research and development information necessary to continued progress.

The Fire Research Center will be organized under the Research Department, of which Hubert Woods is director. The Structural Development Laboratory will be under the Development Department, Douglas McHenry, director.

Bates described the Structural Development Laboratory as in effect "one giant testing machine." Conventional testing machines will not be used in the building. Instead, testing equipment will be constructed as required from large elements of structural steel shapes, and hydraulic jacks. Holes on three-foot centers through the reinforced concrete floor will allow testing equipment to be bolted down.

The required strength and rigidity of the testing floor will be developed through a type of construction involving box girder action in the longitudinal direction and truss action in the transverse direction.

The Fire Research Center will ultimately contain six furnaces large enough to handle tests on full-scale

beams, columns, walls and floor slabs. The laboratories will be the largest of their kind devoted to research on concrete. Fire laboratories are maintained at the National Bureau of Standards in Washington and the National Board of Fire Underwriters sponsors Underwriters Laboratories, Inc., in Chicago, but these are devoted almost entirely to establishment of fire resistance ratings. In addition the PCA Fire Research Center will be used for research aimed at improving the fire resistance of concrete and concrete building elements.

Both buildings will have overhead cranes that will travel the full length of the main testing areas. An unusual feature of the Fire Research Center will be a large movable partition which will separate the air conditioned casting and storage area from the furnace room. It will be so constructed that it can be opened to allow passage of the crane when specimens are to be moved from the storage area to the furnaces.

Initial emphasis in the Fire Research Center will be placed on determining the fire resistance of prestressed concrete, since more information on it is needed for current applications. Other factors to be included in early studies are strength and type of concrete, method of curing, thickness and shape of section, type and amount of reinforcement, bonding of prestressed reinforcement, thickness of cover and surface preparation.

In the new Structural Development Laboratory, one of the first projects that will be undertaken is a study of various types of connections used with precast structural members. Another high-priority project will probably be extensive study of full-scale concrete floor slabs.

In announcing plans for the two new buildings, Kennedy stated that with these additions to its present facilities, the association will have by far the largest and best equipped cement and concrete research and development laboratories in the world.

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Neat Idea

Wallpaper in industrial plants is the newest idea in the trend towards attractive, well-kept factories, *Factory Management and Maintenance* says. Wallpaper is said to create the home-like atmosphere that women workers welcome.

Bell's Invention Receives Plaudits

Alexander Graham Bell's invention has grown to a mighty, far-flung complex that does many more things than transmit conversation, and it will do even more in the future.

H. R. Huntley, American Telephone and Telegraph Company, New York, told a wire communications session at the Summer and Pacific General Meeting of the American Institute of Electrical Engineers at the Fairmont Hotel in San Francisco that the hands-free method of phone conversation will spread; seeing the party with whom you are talking may eventually become common, and there will "undoubtedly be a whole host of new requirements for data transmission to computing machines, television of all kinds—fast, slow, color, and maybe even three dimension—and nobody knows what else. But whatever comes, it is the job of the telephone industry to provide the means for transmitting the necessary information."

He reviewed the telephone picture—

present and future—in a paper, "Where We Are and Where We Are Going in Telephone Transmission."

While transmission has improved immeasurably since Bell's day, in five or ten years the typical telephone conversation will be equivalent to talking to a person sitting across your desk, he said.

Electronic devices are playing a greater and greater role in telephony, he said, posing complex engineering problems as well as those of maintenance. People must be educated to keep the complex telephone networks in top order.

"The job rests more on people than on instrumentalities," he said. "And therein lies the problem—and the solution. People can be educated; machines cannot. And while it is much more difficult to educate people than merely to train them, the rewards are correspondingly greater. But there is no alternative. Electronic gear is here to stay and it will have to be kept in adjustment by people. And the closer one gets to the people who have to do the job, the more confident he becomes that it can and will be done."

The job of giving constantly better and more pleasing transmission and of caring for the constantly widening scope of the telephone business is a big one, he observed, "but then, it is only by meeting such challenges that progress is made."

It is quite likely that transistors will play a big part in future telephone design, but it is too early to be specific about their functions, he said.

Radio plays a major role in telephony and probably will be even more important in the future. Its principal use now is for carrier. Of the 33,000,000 miles of Bell carrier circuits now in use, 23 per cent are on radio relay. Of the 69,000 television channel miles, 70 per cent are furnished by radio relay. He said that the use of short haul microwave systems will increase "quite rapidly to care for growth in areas which are largely supplied by open wire lines and to secure improved service reliability by diversifying routes and types of facilities."

Nobody knows for sure what television developments will ensue, "but it looks as if it will be at least a big animal."

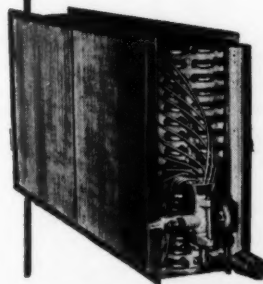
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Engineers Raise Living Standards

Engineers have contributed much to the betterment of our standard of living and to national security, M. S. Coover, associate dean of engineering, Iowa State College, said June 25 in San Francisco in an address following announcement of his election as 1956-57 president of the American Institute of Electrical Engineers, the largest technical society of its kind in the world. Coover was presented with the President's badge by Morris D. Hooven, current president, at the 72nd annual meeting of the Institute in the Fairmont Hotel, opening the five-day Summer and Pacific General Meeting of the Institute.

"We are living in a high-velocity world today by all standards of comparison," Coover said. "It goes without saying that engineers have contributed much to the betterment of our standards of living and to the upgrading of our national security. Law makers and public officials of all nations, including our own, have profound influence upon the direction that we in our own nation must and probably will take in the future. But we are not entirely without a measure of confusion in our world of high-speed communications, transportation and manufacturing, or in the building of social structures, or in education. It seems clear that as long as tensions continue to exist, we must continue to move at a high pace in every facet of our existence trying always as best we can to steer a proper course. In this respect, all who have had specialized training in the various areas can have a real influence if we will but make the best use of our heritage by assuming our privileges and duties as citizens. Progress is made by combining the best of good judgment and understanding at all levels as it concerns the present and future welfare of men and nations."

Early Merchant

The use of cedar—oiled and fragrant—was universal in the great temples of ancient Greece, Rome and Jerusalem. King Hiram of Tyre, who furnished much of the wood for the temple of King Solomon, is generally regarded as the first great lumber merchant.

Air Conditioner Makes, Melts Ice

A unique air conditioning system that raises the temperature of cold air in the winter by making ice and uses the ice to reduce the temperature in the summer has been put into service at the Stobie section of the International Nickel Company's Frood-Stobie Mine in The Sudbury District of Ontario.

Instead of stoking the furnace or turning on the oil burner when the thermometer dives below zero during Northern Ontario's frigid winters, ice production is stepped up to take the chill off the fresh air supplied from the surface to the mine workings. Basis of this unusual system is a convenient twist of nature whereby heat is released when ice is formed.

The fan that delivers the air to underground has a diameter of 198 inches and is one of the largest in the world. This powerful fan, which has a top capacity of 750,000 cubic feet per minute, blows fresh air from the surface through a 300-foot vertical airway 20 feet in diameter into two huge open stopes mined by the blasthole method for this purpose between the 300 and 500-ft elevations. Each stope is 80 feet wide, 200 feet long and 200 feet high, and the stopes are separated by a pillar 70 feet wide. The air circulates through the two stopes in succession on its way to the main intake.

Water from the mine's pumping system is furnished at 120 pounds pressure to the four spray points at the top of each stope. The volume of water required in winter months varies up to 200 gallons per minute. The fine particles of water sprayed into the air passing through the stopes turn to ice, and

the heat given up in the process is transferred to the air. Some 40,000 tons of ice were formed at the bottom of the stopes during the past winter. This heat, along with that absorbed from the large area of wall rock exposed in the stopes, added up to 15,000,000,000 British thermal units, or the equivalent of burning 100,000 gallons of oil or 850 tons of coal.

Although the surface temperature during the winter ranged to 25 degrees below zero, the fresh air delivered from the main intake of the mine ventilation system 600 feet below the surface varied only between 27 and 30 degrees above zero as a result of its side trip through the ice stopes. The temperature eventually is expected to be held at about 32 degrees above zero as the system is improved.

When the volume of air handled through the system ultimately reaches full capacity of 750,000 cubic feet per minute, as compared to 150,000 to 300,000 c.f.m. during the past winter, upwards of 140,000 tons of ice will be formed in the stopes during each winter.

In the summer the ice will be melted as the warm fresh air passes through the stopes, and the air will be cooled between five and 10 degrees. The humidity of the air will also be reduced as it cools below the dew point and much of its moisture drops in the stopes. This phase of the Stobie air conditioning is similar to that at Inco's Greighton Mine, where fresh air being delivered to the mine is cooled by passing it through the natural refrigeration system in the old workings where seepage water freezes during the winter.



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At other Inco mines where heating of fresh air is required during the winter, steam or oil installations are used. When the Stobie operation was being planned and it was noted that the logical position for the main fresh air intake lay near a low-grade section of the orebody conveniently located between the two main mining areas, the feasibility of establishing ice stopes presented itself. As a result, Stobie has been equipped with a remarkably efficient air conditioning system at a fraction of the cost of a surface heating plant.

Faculty, Students Study at Argonne

Seventy-six faculty members and 41 students representing 63 American educational institutions have been accepted for summer employment at Argonne National Laboratory. The Laboratory, operated for the U. S. Atomic Energy Commission by The University of Chicago, makes such appointments annually to encourage research and to strengthen teaching.

In addition, 61 faculty members from 36 American engineering colleges and universities are enrolled in a two month Nuclear Energy Institute being held at the Laboratory (beginning June 25). The Institute, the first of its kind, is being sponsored jointly by the Laboratory, the Atomic Energy Commission, the American Society for Engineering Education, the National Science Foundation, and Northwestern University. The purpose of the Institute is to provide engineering college faculty members with training which will help them to incorporate nuclear engineering material into their courses of instruction.

Railroad Research Center Is Going Up

Ground was broken March 15, for the third building at the Association of American Railroads' research center on the Illinois Institute of Technology campus in Chicago.

The \$500,000 building—latest step in a long-range program to provide complete research facilities for the railroad industry—will be used primarily for rail, track, ballast, detector car, and structural research.

The structure, designed by Ludwig Mies van der Rohe, will be the 22nd new building to be constructed at Technology Center—the name given to Illinois Tech's campus—since 1943.

Speaking briefly at the ceremony were Dr. John T. Rettaliata, MWSE, president of Illinois Institute of Technology; R. G. May, AAR vice president in charge of the operation and maintenance department, and William J. Hedley, chairman of the AAR engineering division.

Other officials taking part in the program included Gerald M. Magee and William M. Keller, AAR director of engineering research and mechanical research, respectively.

One hundred and thirty-two railroads in the United States and Canada are members of the Association of American Railroads. Investigations at the research center are designed to promote safety, economy, and excellence of rail service to the public.

The AAR research center was established on the Illinois Tech campus in 1950. Since then two buildings—an administration building and a mechanical engineering laboratory facility—have been constructed.

The new structure will be of welded steel frame construction with areas of buff brick and large glass panels, similar to the other Mies-designed buildings at Technology Center. It is expected to be in operation by early 1957.

Better Copter Rotor Is Subject of Contract

Contract to design, manufacture and flight test a radically new vibration-reducing, low maintenance, low cost helicopter rotor that will greatly decrease rotary wing aircraft cost, both initially and operationally, has been awarded to Piasecki Aircraft Corporation in Philadelphia, by the U. S. Army.

The Piasecki-design rotor eliminates many parts in the present assembly of rotor blades and their attachment to the drive shaft and 80 per cent of the bearings in the present hinge-assembly design.

Elimination of these complexities in existing units will extend the time between overhaul periods, reduce their repair time, increase the aircraft's serviceable operating time, minimize the points of daily lubrication and substantially reduce annual operational costs.

Although designed especially for replacement in the H-25 helicopter, now used by the Army for training and light transport tasks, this new principle of rotor design can be extended to replace present helicopter rotor systems.

Piasecki Aircraft Corporation, established by Frank N. Piasecki and his associates, all pioneers in the vertical lift aircraft field, have submitted 18 additional proposals to the Army, Navy and the Air Force. These are pending evaluation at Washington and elsewhere.

Scheduled deliveries of subcontract work has started from the company's plant at the International Airport in Philadelphia to six of the leading aircraft and missile prime contractors in Eastern United States. Shop work and engineering design and studies involving 30 other small contracts are progressing.

On the Beam

For generations a timber beam has supported the 2,000-pound Liberty Bell in Philadelphia's Independence Hall. The beam was examined recently and declared to be in excellent condition.

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Better Patent Protection Sought

The Biennial Congress of the International Association for the Protection of Industrial Property, convening in Washington, D.C., May 28 to June 2, recommended a series of treaty revisions designed to strengthen the protection of patents, trademarks and service marks in industry throughout the world.

These recommendations will be submitted to the Diplomatic Conference scheduled for Lisbon, Portugal, some time in 1957, which will consider revisions of the General Convention for the Protection of Industrial Property signed at Paris in 1883.

The convention has been amended by diplomatic conference on four occasions—at Brussels in 1900, Washington in 1911, The Hague in 1925, and London in 1934. The United States first ratified the treaty in 1887, and has ratified each subsequent revision.

The action of the Congress is regarded as of prime importance in the patent and trademark field because, historically, no revisions of the general treaty have ever been made without the approval of the Congress.

The Congress agreed:

1. That no patent should be refused or cancelled solely on the ground that the sale of the product governed by the patent is prohibited.

2. That non-use of patents in foreign countries should not be deemed to be an abuse or monopoly and therefore no forfeiture or compulsory license should be permitted.

3. That there should be no limit on the durability of pharmaceutical trademarks or the right to the exclusive use of such trademarks so long as the sale of the products is lawful.

4. That service marks should be given the same recognition and protection afforded trademarks and that service marks should be defined.

5. That the misrepresentation of products as to geographical origin, quality of ingredients should be prohibited. Officials of the Congress said that this recommendation, if adopted in the treaty, could have far-reaching effects.

6. That official treaty texts shall be in both French and English, but that in the event of conflict the French text shall prevail. This resolution was adopted over the vigorous opposition of the French delegation. Throughout the Gen-

eral Convention's long history only French has been the official language.

The question of the patentability of chemical products, as distinguished from chemical processes, was scheduled for a thorough airing at the Congress, but did not reach the floor due to time limitations.

At its concluding session the Congress elected Christian von Sydow of Sweden as president of the International Association. He is chairman of the Federation of Swedish Industries and succeeds Roy C. Ingersoll, Chicago industrialist, as president.

The delegates voted to hold the next Biennial Congress in Stockholm in 1958.

More than 600 delegates from 44 countries attended the Washington Congress, first to be held in the United States. All previous sessions have been in European cities.

Until the Washington meeting, association officials said, there had been a tendency on the part of Western Hemisphere countries to adhere largely to inter-American agreements pertaining to patents and trademarks. But the interest shown by delegates from all the Western Hemisphere countries, officials said, indicates that they will be more favorably disposed to adhere to the Paris Convention, thereby making it a truly universal treaty in this field.

Age Barrier Lowered

Cleveland metalworking firms are letting down the age barrier for skilled workers, *American Machinist* reports. Hiring policies currently are extending up to 60 years of age.

Japanese Tunnelers Establish Records

After seeking U.S. advice for construction of Sakuma hydroelectric dam now nearing completion, the Japanese are outdoing their stateside teachers, laying claims to world records in tunneling and concreting, according to *Engineering News-Record*.

The dam marks the completion of a 20-year dream to develop an almost ideal hydro site on Japan's most strategically located power-producing river. Midway between, and only 150 miles from each of Japan's largest load centers—Tokyo and Osaka—Sakuma offered a capacity of 350,000 kilowatts if a short 965-foot dam could be built 504 feet high across the fast-flowing Tenryu River.

But the granite hills of the Tenryu Valley, whose slopes often defy even mountain goats, made the Japanese hold back, until three years ago when they decided to combine native labor with U.S. know-how and the biggest of American equipment. They since have proceeded to outdo their stateside teachers by challenging world records, taking second place in tunneling by removing 30,810 cubic feet per day from one of the 37-foot-diameter diversion tunnels at Sakuma, just a few hundred feet less than the champion Swedes. Had not a 6x8 foot pilot drift been driven, whose entire volume was deducted from the total, it is probable the Japanese could have laid claim to a new world's record. This is even more remarkable considering that full-face blasting in headings this size had never before been attempted in Japan, the magazine says.

The Japanese are also in second place on the basis of volume removed per



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driller—2,055 cubic feet per day compared to the Australian record of 2,562 cubic feet. While daily drilling advances averaged 21 feet, for seven consecutive days 30 feet per day was achieved.

Underground Station To Be Constructed

The first underground hydroelectric generating station built in the United States since 1913 will be constructed on the North Fork of Kings River, high in the California Sierra Nevada Mountains, it was announced in San Francisco at the Summer and Pacific General Meeting of the American Institute of Electrical Engineers in the Fairmont Hotel. The station is one of three to have a capacity of 296,000,000 watts.

The underground station is known as the Haas Project, it was reported by W. R. Johnson, D. P. Dinapoli and J. B. Cooke, of the Pacific Gas & Electric Company, San Francisco. Since World War II some 100 underground generating stations have been built all over the world, except for the United States, although this country built three of the earliest underground stations at the turn of the century.

Two of the three plants in the high granite country about midway between Mt. Whitney and Yosemite, will be among the highest head plants in the United States. The three plants are scheduled for completion in 1959-61.

The projects will include the largest vertical impulse turbines in the United States, a high head penstock crossing the river, two high rock fill dams; unlined pressure tunnels and automatic operation of the plants.

Engineer Suggests Idea for Increasing Supply of Engineers

The possibility of doubling the supply of engineers and scientists by including more women in the profession was underscored recently by Morris D. Hooven, president of the American Institute of Electrical Engineers.

Hooven has gone even a step further by envisioning a woman as president of the world-wide Institute a century hence. The society now has a membership of more than 49,000—most of them males. Of the more than 1,500 fellows of the institute, all are men, except Professor Edith Clarke, of the University of Texas.

These interesting—if not alarming—prognostications are contained in a letter by Hooven to the president of the Institute in 2055, which has been placed in the "Vault for the Future" at The George Washington University, Washington, D. C.

Hooven's letter was one of the evidences of technology and engineering in the nation's capital sealed June 20 in the "Vault," which was dedicated at the Tompkins Hall of Engineering, The George Washington University. The vault, which will remain sealed for 100 years, contains contributions by engineering societies, government agencies and others. The electrical engineering evidence, including a report of the board of directors of the American Institute of Electrical Engineers, a copy of *Electrical Engineering*, a description of the Potomac Electric Power Company, and of the Bryant Street Pumping Station, and evidence of present-day telephone and telegraph communications, compu-

ters, lighting, and a copy of the National Electric Code, was gathered by the Washington Section of AIEE, and sealed in a separate copper box. The committee assembling the electrical materials was composed of Daniel C. Vaughan, Glen L. McKinley and William J. Ellenberger.

The vault project was conceived by Dr. Cloyd H. Marvin, president of the university, and has been more than a year in the making.

Hooven's letter is addressed "To the President of the American Institute of Electrical Engineers in the year 2055."

In part, it says: "Dear Sir or Madam: . . . Simple arithmetic shows that if we are to meet the demands for scientists and engineers which your generation will present to the community, we must consider doubling our basic source of supply to taking in the womenfolk. Their acknowledged superiority in intuition and flexibility of mind might well contribute extraordinarily to the electrical engineering profession."

Hooven assured the Institute President of 2055 that there is little danger that the machine will master man. "The majority of us," he wrote, "are quite sure that we are addressing you, our successors, as the continued Masters of the Machine, asserting your intellectual control over the physical universe without too much fuss and furor."

"We electrical engineers have no doubt that in the short one hundred years that lie between the time this is written and the time it will be read, the already large amounts of energy available for the use of each of us will be multiplied many, many times; that you, our successors, will be presenting your community with the possibility of living a kind of life scarcely limited by the necessity of physical labor."

The Old Has a Touch of the New

Fifty-five "antique, oil-burning" cast iron posts and lanterns have been installed to light the footpaths of Philadelphia's Washington Square. The colonial lanterns, patterned after styles existing two centuries ago, were specially created to promote historic atmosphere in the park. However, they are served by four underground three-wire electric cables; inside the lamps are 200-watt bulbs, notes *Electrical Construction and Maintenance*.

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WSE's 87th Annual Meeting

Mr. Albert P. Boysen, outgoing president of the Western Society of Engineers, opened the Society's 87th Annual Meeting and Dinner, held at the Furni-



Above, left to right: William R. Marston, Thomas G. Ayers, Thomas H. Coulter, and Albert P. Boysen.



Above, left to right: Philip L. Coleman, Ormas G. Smith, John F. Sullivan, Jr., J. T. Rettaliata, and John P. Gnaedinger.



Above, left to right: John P. Gnaedinger, Charles F. Murphy, Robert S. Hammond, Charles L. Mee, Arthur R. Harris, and E. A. Schmidt.



Above, left to right: Ernest R. Hendrickson, Joseph Kucho, Thomas M. Niles, Dick Van Gorp, Robert H. Bacon, and Virgil E. Gunlock.

ture Club of America in Chicago, on June 5, 1956. He then introduced the officers and members of the Board of Direction at the Speaker's table (See pictures on this page).

"The men you have just met," Mr. Boysen explained, "comprise the Society's officers and Board of Direction. They have been elected by you to direct the affairs of the Society so that it will continue to be the greatest engineering society in the Midwest.

"A year ago, when I was installed as president of the Society, I stated that to derive the fullest benefit from the Society the members should take an active part in the various committees which carry on the work of the several functions of the Society. I am happy to report that many members took heed of my advice. All of the committees performed an excellent job during the past year.

"The work of certain committees is obvious to most of the members. For instance, everyone is aware of the excellent work of the Program Committee. The innovation of having one big meeting of the Society every month instead of four smaller meetings proved highly successful, each general meeting during the year being practically a sellout. This is also true of the Special Events Committee, the Publications and the Advertising committees.

"Many other committees also performed excellent work, but the results of their efforts are not nearly as well known to the majority of the members.

"Through your acceptance of higher rates of dues last year, the Finance Committee was able to operate the Society within the budget and put us back into the black—a highly desirable condition.

"The Young Engineers' Forum Committee continued the success of previous forums, having had 135 registrants.

"The Civic Committee did an outstanding job of analyzing several problems involving superhighway and mass transportation, and Chicago port facility studies.

"The Education Committee, cooperating with the General Education Committee of the Engineering Societies in Chicago, sponsored four special courses which were attended by 122 individuals.

"The work of the Admissions Committee must not be overlooked. They have continued to thoroughly investigate and review the records of each applicant for membership before making their recommendations to the Board of Direction.

"I could continue to give reports of the accomplishments of the other committees *ad infinitum*, but let it suffice to say that the board of direction and the officers greatly appreciate the work and energy with which each member of these committees performed his specific duties.

"Last, but not least, we must acknowledge the excellent work performed by Mr. Harrington and his staff. The operation of the dining room and bar, the fine service rendered the individual members and the other technical societies utilizing our facilities, contributed largely to the excellent financial showing we have made the past year, thus keeping our Society financially sound.

"One of the pleasant duties of a retiring president is the presentation of awards and Life Membership certificates.

"This year seven of our members have earned the honor of receiving Life Membership certificates, namely, E. P. Everhard, Erik Floor, J. F. Hewson, Howard C. Madson, Ellery B. Paine, James H. Sawyer, and Ludwig Skog."

Mr. Boysen then presented certificates to those recipients present.

Mr. Boysen then continued:

"It is my pleasure to award an honorary membership to one of our hardest working and most conscientious members, Mr. E. Gordon Fox. Mr. Fox joined the Society in 1921, becoming a Life Member in 1951. During his membership in the Society he participated in the work of practically every committee of the society, culminating in his being elected to president for the year 1940-41. Prior to his retirement he was for many years vice president of Freyn Engineering Company, and participated in the design and erection of steel mill facilities the world over.

"For his many faithful years of service to the Society, we award Mr. E. Gordon Fox Honorary Membership in the Western Society of Engineers.

"Unfortunately, Mr. Fox is ill and



Above at left, outgoing president, Albert P. Boysen, speaks into microphone while George L. Jackson, the new W.S.E. president, listens.

could not be present at the meeting tonight, but he did send a note acknowledging this honor. (The Western Society regrets to announce that Mr. Fox died of his illness on June 6.)

"Each year the Society honors certain of its members for outstanding service performed by them during the previous year. This year three of our members have earned this award:

"For his distinguished service in organizing and directing the Young Engineers' Forum, I am happy to present this Service Award to Mr. Thomas G. Ayers, chairman of the committee. Mr. Ayers is vice-president of Commonwealth Edison Company and has spent many hours of labor organizing the Young Engineers' Forum both this year and other years.

"For his initiative and perseverance in promoting the monthly programs sponsored by the Society, it gives me great pleasure to also present a Service Award to Mr. Philip L. Coleman, chairman of the Program Committee. Mr. Coleman is a partner of Duff and Phelps, public utility analysts, and as chairman was responsible for the interesting and instructive group of programs which our members enjoyed the past year.

"The Civic Committee is one of our most active committees. This year they performed an outstanding job in their

studies of civic matters under the leadership of Daniel Chinlund, chairman. For his active leadership of this committee, it is an honor to present him this Service Award. Mr. Chinlund is general plant manager for the Illinois Bell Telephone Company, and the work of the Civic Committee has been one of his special interests for many years.

"Unfortunately, Mr. Chinlund could not be present tonight to accept this award, as he is presently in Asbury Park, New Jersey attending the Bell System Executive Conference.

"Before presenting your newly elected president, I would like to take this opportunity to express my appreciation for the privilege of having served you the past year. It has been a most interesting experience. It would be remiss if I did not express my personal appreciation for all of the cooperation and help received from the various members of the Society.

"Your new president comes well qualified to the position for which he has been elected. He has spent many years as an active participant of the various committees of the Society and is well aware of the several functions of the Society. With your help he should have a most successful year.

"It gives me great pleasure to present
(Continued on Page 30)

Progress

(Continued from Page 6)

industry, spells new economic opportunity for you and for me and for our children.

In our competitive economic system, it is only common sense to try to make a discovery obsolete just as soon as you have discovered it. You may have found the best way in the world to make a particular product, but if you don't make it obsolete, through research, your competitor will. Making something better simply means making more of it at lower cost. That's how these teams of technologists we've been talking about, make this nation more productive.

You well may be asking yourselves: "Why is this man talking to us about productivity? What does productivity mean to me?" Right now, gentlemen, I am going to risk your displeasure by being very elemental. I do so, however, not because I need be elemental with this audience, but only because beyond this room there are many people, youngsters in high school and, even college, for example, who, I believe, need urgently to know the significance to them, in their daily lives, of increasing the productivity of American industry.

So I am going to take a simple, hypothetical case to illustrate what productivity means to every man, woman, and child in America. Let us assume that, some years ago, a company produced a refrigerator which could be bought for the equivalent of 300 hours of work and would last six years. Now, at the rate of 50 hours of work a year, a man could pay for his refrigeration in six years time. That wasn't too bad a deal, but some years later, another company, using improved manufacturing methods, produced a better refrigerator for less. This refrigerator could be bought for the equivalent of 200 hours of work and it would last ten years, instead of six. At the old rate of 50 hours of work a year, it could be paid for in four years. That meant that the purchaser of the new refrigerator would have six years of free refrigeration. But what was more important, he had six years during which he could spend the proceeds of 50 hours of work on something besides refrigeration.

As you and I know, but as so many people in this country do not understand, the American standard of living

doesn't just happen. It's the result of creative American production methods.

American industry today has enrolled the largest army of technologists ever assembled. In the Du Pont Company, alone, 2,600 technically trained men and women are at work in 36 laboratories. For a number of years, the company has spent more than 50 million dollars a year on research. Last year we spent 61 millions exclusive of the cost of new laboratory construction.

But one of the truths I would hope most to see carried beyond this room, is the plain fact that every time a research team or an engineering staff find a better or a cheaper way to make a refrigerator, an automobile, or baby carriage, the inevitable result for all of us in this country is the release of new purchasing power.

The conclusion seems inescapable: if we are to continue to create progress in America, if we are to continue to raise living standards for all, we must continue to make men more productive for every working hour. Some people still believe that's just another way of saying men ought to work harder. But you know that the whole history of progress, from the start of the industrial revolution, has been a history of relief of mankind from toil by the constantly increased use of more and better tools of production. It has been achieved not by making men work harder, but by making their work easier and more productive. It's been achieved through the use of brains, not brawn.

The use of tools is the use of intelligence. No one thinks of trying to drive a nail with a rock. He uses a hammer. Everyone recognizes a hammer as a tool. But I wonder to how many people the

word tool would have occurred had they stood with me a few weeks ago in a plain in east Texas and looked out upon miles of pipeline criss-crossing to acres of strange equipment all of it standing open to the sun. They would have said it was an oil refinery, or a modern chemical plant. Well, it is a modern chemical plant. But basically, it is a tool. A tool in which intelligence is applied on a massive scale for the manufacture of methanol, polyethylene plastic, and chemicals for making nylon.

A tool is any instrument for multiplying the effectiveness of human effort. The freight train is a tool. It allows a crew of five or six men to do the work of an army of strong men. Now, the average 50-car freight will haul enough coal into the city of Chicago, for example, to supply it with electric power for a little more than two days. It will make the trip from the coal fields in one day. Thirty-thousand coolies, each carrying 200 pounds, could bring just as much coal into Chicago. But they would take 16 days to make the trip. That's why coolies are paid in pennies and American trainmen in dollars. The difference is the freight train. The difference is the tool.

In the Far East, some 80,000 Malaysians may labor an entire year, working from dawn to dusk in the steaming jungle, and produce no more rubber than 2,000 men can make annually, working eight-hour shifts, in a synthetic rubber plant in Louisville, Ky. The difference is not in the men of the East and the men in the West. The difference is in the neoprene plant. The difference is in the tool.

Let's take an all-American example of the relationship between better manu-

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facturing equipment and better living. Let's take the case of John Leach, operator at a Du Pont plant in South Jersey. Back in 1915, John Leach could make 700 pounds of nitric acid in one hour. Today he makes 5,600 pounds. In 1915, although prices were lower, it took John Leach 534 hours of work to earn enough to buy Mrs. Leach a washing machine, a sewing machine, and a set of dining room furniture. Today, John Leach buys a better washer, a better sewing machine, and better furniture for 251 hours of work. The difference is not in John Leach. As a matter of fact, John's older today and he can't work quite as hard as he did 40 years ago. The difference is in the better nitric acid plant at the Du Pont Chambers Works.

Seldom has American industry displayed its productive might as dramatically as during World War II. A striking example is the story of the Oerlikon anti-aircraft gun. Early in the war, an American company was given a contract to manufacture the gun. It was provided with two French machines for boring gun barrels. Each machine took one hour and three quarters to bore one gun barrel. You can imagine how long the management of the American company would stand for that. It wasn't long before the company had designed and put in operation a machine which would bore a gun barrel every $7\frac{1}{2}$ minutes. Then another machine was designed which would bore 12 gun barrels simultaneously every $7\frac{1}{2}$ minutes. The French way was to produce one gun barrel per machine every 105 minutes. The American way: one gun barrel per machine every $37\frac{1}{2}$ seconds.

Small wonder, isn't it, that Hanson Baldwin, that distinguished military an-

alyst of the *New York Times*, concluded, and I think somewhat shockingly to some people, that the war was won by the superiority of American industry. Now Mr. Baldwin was well aware, as are you and I, that victory came directly in battle. But basically, Mr. Baldwin was right. He said the industrial strength of America was the dominating and decisive factor in that war. He thought it might be even more decisive in the future.

I should like now to turn the calendar back to 1850. In that year, 90 per cent of the nation's industrial production was achieved by man-muscle. Today, that frightful statistic has been reversed. Today 90 per cent of American industrial output is by machines. And, gentlemen, that is the basic reason why this nation was the first in the world to make the 40 hour week standard in industry. I can almost hear someone saying: "That's not right. We passed a law."

We passed a law. But the law never could have been effective had not American technology been sufficiently productive, for each man-hour worked, to enable our industry to satisfy the demands of the American economy on a 40-hour week.

The cheaper and better refrigerator, the freight train instead of the coolie, the modern industrial plant, our teams of technologists, our industrial managers and enterprisers—these are the people and the things which have built our progress. It has not been the promoters of pie in the sky to all men at all times who have made America what it is today. There is only one way we can continue to progress. Basically, it's the way we have done it in the past: through the use of more and better tools.

We are living in a time of revolutionary progress made possible by tools and techniques of production more abundant and complex than any of us really can imagine. And also more costly. That Texas tool for making nylon chemicals cost 100 million dollars. In the Du Pont Company we have \$23,000 invested in tools of production for each of our some 90,000 employees. That's like saying that the average Du Pont employee has a \$23,000 tool kit.

Obviously, much of the money needed for the better tools which American industry must have if our rate of progress is to be maintained, must come from the investors in America, from those with faith in America and its people, from those willing to put their savings to work—or their excess earnings, if you please—in the expansion of American industrial production. Gentlemen, I am not trying to sell a share of stock in anyone's company. I merely am trying, perhaps at the expense of laboring a point, to put into some kind of focus, the economic role of the investor. The function of the investor is the same whether he holds one share of stock or a thousand. And the motive of the investor is the same, big or small. The motive is a reasonable return on money sown for the growth of American industry.

Thus motivation, it seems clear, is the indispensable element of growth in a free economy. Take it away, and we stand still. And to stand still, industrially, in the world today can be an extremely hazardous thing.

It is a fact that if the automobile industry had to produce cars today using tools and methods of 1905, and pay today's wages, the automobile would have to sell for about \$65,000. You can imagine how many automobiles would be sold under those circumstances, and what kind of steel industry this country would have, and what kind of rubber industry, and petroleum refining. Had just one American industry, automobiles, stood still for just 50 years, that alone would have been sufficient to make the United States of America a third-rate industrial power. We would be one of the have-not nations of the world.

I don't think we can deceive ourselves about the penalty we shall pay if we fail to increase the pace of our progress. The economists tell us that we shall need at

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least 25 billion dollars in new capital every year between now and 1965 simply to supply today's standard of living for the 190,000,000 we shall have in this country then. Eighty-three million of those people will either be under 18 or over 65 years of age. Substantially all of them will be out of the work force. We shall have, proportionally, a smaller work force, in 1965, than we have now. There is only one way fewer people can produce what the American nation needs, and that is to see that nothing interferes with the system which, up to now, has made this country more and more productive.

What do I mean by the system? I simply mean our system of self-organized teams of technologists: the men and women in the plants and offices and laboratories. The people in the service industries. The managers, or captains of these teams, And I mean the business enterprisers, and the investors.

You discourage the incentive of any member of the team and you weaken the system. Unwise policies of taxation could do it by confiscating the rewards

of thrift. Measures which restrict industrial growth in the name of some doctrinaire concept could be equally effective. Undue regulations of working men and women—and that's all of us—could do it, also. It is easy to undermine incentive. It may be fatal.

Those of us who know that progress must be created, know that the ultimate creators are those who provide the tools of production and who improve them day by day. Anything that discourages them, or weakens their motivation, weakens America, and that is bad for us all. Anything that encourages them and strengthens their motivation, strengthens America, and that is good for us all.

Some moments ago, I referred to what Hanson Baldwin had to say about the relationship of industrial strength to national security. You and I do not know what may be in the minds of the men in the Kremlin this afternoon. They appear to have undergone some change. But changed or not, we may be certain that they would like very much the answer to just one question: "When do we catch up with industrial America?" Well, if industrial America does not forget how it got where it is this afternoon, it can give those fellows, for all time, a one-word answer: "NEVER!"

We have been living in a time of world-wide fear and uncertainty. It would seem downright cynical for any speaker to try to make people forget apprehensions with some kind of inspiring oratory. This I have not undertaken to do. I have tried only to tell you, as emphatically as I know how, a straightforward story of why America is the strong nation it is today. The story is plain. The story lacks glamor. But so, often, does the truth. And this is the

truth. And the truth is something we can tie to in times like these. Regardless of what may happen at any future conference of world leaders—any future Geneva—you and I need only know this truth about ourselves, have faith in ourselves, and faith in our Providence, to be able to banish the shadow of fear from our world and walk together into our tomorrow with all reasonable confidence.

ASHAC Has New Nuclear Committee

Because of the interest in nuclear energy and how it may affect the heating and air-conditioning industry, a Nuclear Energy Engineering Committee has been formed by the American Society of Heating and Air-Conditioning Engineers. This was announced by President John W. James at a recent meeting of the Council of the Society.

The chairman of this committee is Ralph A. Sherman, Columbus, Ohio, treasurer of the society and technical director, Battelle Memorial Institute.

According to Mr. Sherman, one of the objectives of this committee will be "to keep abreast of developments in nuclear energy affecting the heating and air-conditioning industry and to serve as the principal source of information in this field for dissemination by the Society."

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Large truck tires of synthetic rubber have been developed that are said to be the equal of natural rubber tires, *Fleet Owner* says. Prices are expected to be competitive with present tires.

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News and Notes

Major changes in the Library's physical plant are now under way, as a result of action by the Board of Directors at their June meeting. One of the most urgent needs of the Library has been, for some years, suitable storage conditions for its valuable and partially irreplaceable collections. Air conditioning of library book stacks has been common practice elsewhere, in order to insure proper care for books and periodicals. Crerar Library, located in a region of extremely heavy dustfalls, has watched the dirt accumulate on its miles of shelves faster than it could be removed; readers and staff alike find unpleasant the handling of grimy books. In addition, other poor atmospheric conditions have allowed more rapid deterioration of materials than would be true with proper controls.

The new plans will provide for air-conditioning of the 5th through 8th floors of the building, which contain six stack levels. Windows are to be sealed with double frames; temperature and humidity control, together with electronic dust precipitators, will maintain an environment designed to prolong the existence of Crerar's collections and, once the books are properly cleaned, to keep them that way.

Renovation of this building space will include conversion of the Michigan and Randolph perimeter of the 5th floor to office space. Using movable-type partitions, air-conditioned offices and rooms

of varying size will be available for rental to societies and industrial organizations wishing to maintain space at the Library location, joining the nearly twenty scientifically-connected groups now housed in the Crerar buildings.

Considerable internal reorganization will be necessary to effect these changes. An expanded program of book deposits at the Midwest Interlibrary Center is now under way. Disposal of the out-of-scope library materials is expected to be completed during the coming year. A complete shifting of the collections will free space for the offices mentioned above. Special areas are also to be designated for a map room, receiving and mailing facilities for the Acquisitions Department, and for special collections such as the Translation Pool and for rare and older materials.

Gary Steel Works Celebrates 50th Year

The cutting of a stainless steel ribbon with a pair of gold-plated shears opened one of the most colorful public open houses in the steel industry. The event at 8:30 a.m., Tuesday, June 12, climaxed the 50th year of the United States Steel Corporation's Gary Steel Works, world's largest integrated steel mill, which in a half-century of operations has produced 171 million tons of steel, more than any other steel plant in the world.

Gary Steel Works' open house lasted two days, June 12 and 13. Besides the tour of the steelmaking facilities, there was over a quarter of a mile of exhibits in tents throughout the plant.

In exhibition tents the story of steel-making was portrayed through colorful

displays, murals and working models of steelmaking equipment. Separate displays of training and safety equipment were also shown.

Open house visitors not only saw basic steel being produced, but saw the products made from Gary Steel Works steel. For example, jet engines, household furnishings and appliances, agricultural equipment and a cut-away model of a modern automobile were displayed.

At the steel plant's main entrance, visitors were greeted by Mary Kay and Johnny, well known television personalities.

Outside the main reception tent children were provided free rides on a miniature train which was set up next to a playground full of swings, teeter-totters and other playtime equipment. The playground was supervised by a trained staff. Nearby was a nursery tent, fully equipped, for the very young set of visitors.

Next to the main exhibition tent, which was located inside the steel plant, visitors had an opportunity to examine at first hand the ultra-modern stainless steel "Talco" train of the Rock Island Railroad. Alongside the "Talco" was an 1875 steam locomotive, tender and palace cars which were in operation in 1906, the year Gary Steel Works was constructed.

To add to the holiday atmosphere, coffee and donuts, milk and soft drinks were served throughout the tour. Souvenir tour books and medallions were distributed to each visitor.

The open house visitor saw the raw materials of the steel industry, ore, limestone and coal transformed into orange-hot ingots, rolled into basic shapes, and then viewed the final products of steel, ranging from kitchen appliances to huge industrial machinery.

Food for Thought

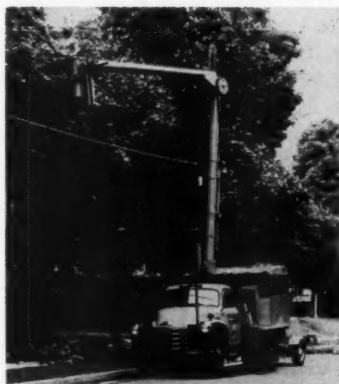
All men's essential food requirements might someday be produced from coal and petroleum, reports an article in *Coal Age*. A top organic chemist estimates one million pounds of a synthetic protein—as nutritious as lean meat, milk and eggs—could be produced each month from fossil fuels at a cost of less than four dollars a pound. For the average family this adds up to 40 cents a day for proteins.

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Reviews of Technical Books



Electronic Engineering

Electronic Engineering, by Samuel Seely, McGraw-Hill Book Company, Inc., New York 36, N. Y. 1956. 525 pages. Price \$8.00.

This book, and its companion volume *Radio Electronics*, are both revised and enlarged from Samuel Seely's *Electron Tube Circuits*. However, each one is an independent, self-contained text. Much new material has been added.

In *Electronic Engineering*, a great variety of electronic circuits is discussed in detail. These are important in the fields of radar, television, electronic control and instrumentation, and computers. As a result, the analysis of circuit operations is dealt with thoroughly, but some of the factors that are important to circuit and synthesis are also included.

In order to train the student in techniques of analysis, alternate methods of analysis of a given circuit are presented. The material is developed through various analytical methods. Concrete examples and problems, which correlate theoretical developments with practical situations, are employed.

Seely develops the analysis in two phases, if it is expedient. First, a physical explanation of the operation of the circuits is offered. Second, a mathematical analysis of the operation of the circuit is made; this illustrates the techniques of analysis, derives a solution that gives a description of the operation of the circuit, and considers the effects of the various parameters on the operation of the circuit. This should help to give the student of the broad and diverse field of electronic engineering a basic, technical understanding that will aid him in achieving required operational results.

Dr. Seely is professor and chairman of the department of electrical engineering at Syracuse University, where, it is interesting to note, much of the material in this book has been used in courses in electronic circuits and applications.

R.G.G.

Mechanism

Mechanism, by Joseph Stiles Beggs, McGraw-Hill Book Company Inc., New York 36, N. Y. 1955. 418 pages. \$6.50.

This volume is the first in the new *Series in Mechanical Engineering*; it is an advanced text on mechanism. It may also be used by the practicing design engineer as a reference book for the analysis of mechanism as well as a source of mechanical movements.

Beggs suggests, since this text was written for a course in advanced kinematics, that a good background in mathematics and dynamics is important. Then the well-grounded student may proceed at a high level and complete the course in one semester. He developed this course in the department of engineering at the University of California at Los Angeles.

The text first discusses the twofold nature of mechanical design; that is, the selection of the mechanism to produce the required motions and, after this, the design of the members of the mechanism. The author makes it quite clear that for best results, there must be harmony between the two phases.

Comprehensive coverage is achieved by: discussing factors affecting the design members and the design as a whole; the use of descriptive geometry, analytical methods, and many clearly-explained illustrations; chapters that deal with the synthesis of gear tooth curves and the efficiency of planetary gears to mention but a few of the informative subjects, which are relative to mechanical engineering.

The Newtonian Mechanics of Rigid Bodies, using vector notation, is ably presented in one chapter.

New subjects are also discussed; for example, the hydraulic controls of the Packard automatic transmission, and material on space mechanisms.

References for further study and a glossary of terms are also given.

R.G.G.

Automatic Control

Random Processes in Automatic Control, by J. Halcombe Laning, Jr., and Richard H. Battin, McGraw-Hill Book Company Inc., New York 36, N. Y. 1956. 434 pages. Price \$10.00.

The purpose of this book is to give the practical engineer and the theoretical research scientist a basic background in control systems engineering.

Laning and Battin compiled the material presented from a set of lecture notes, first prepared in 1951. Originally planned for a one-semester course, this text is much more extensive in scope. The authors suggest exactly how the contents may be abbreviated, if it seems necessary, without essential discontinuity.

The nucleus of the book is contained in the theory of random signals and noise, together with practical techniques to be used in the analysis and synthesis of linear control systems that are subject to random inputs.

The text first deals with the basic concepts of probability and random time functions. From these fundamental ideas, analysis and design techniques evolve for linear control systems; these include both constant and time-varying components.

Each new idea suggested is illustrated in detail by examples, which are solved and explained. The student's actual knowledge of the more important concepts developed may be tested through problems of varying degrees of difficulty, which are included in practically all the chapters.

R.G.G.

Kinetics Speeds Reactor Design

An atomic scientist from the Westinghouse Electric Corporation described on June 6 how the branch reactor theory known as "reactor kinetics" is being used to speed the development and design of water moderated nuclear reactors in atomic power plants.

Addressing the second annual meeting of the American Nuclear Society, Dr. A. F. Henry of Pittsburgh, Pa., explained how the mathematical equations of reactor kinetics were being applied to the analysis of experimental data and to the design of power plants which will convert nuclear energy into usable power more efficiently, economically and safely.

The Westinghouse scientist emphasized that such information was particularly vital in the study of reactor accident prevention. He said: "Reactor kinetics can be used to study theoretically how an accident might happen. What we do then is to try to design the plant so that an accident like reactor runaway cannot happen."

Dr. Henry described how the theory had pointed out the build-in automatic stability of water moderated reactors.

"Our equations," he said, "predict that as the temperature of water in the reactor rises, the fluid will expand so much that too few neutrons will remain in the core to sustain a chain reaction. Experiments have confirmed this phenomenon. As a result we feel that even if all the safety devices fail to function, a water moderated reactor will still automatically shut itself down as the water reaches higher temperatures."

The atom scientist indicated that this inherent stability was a characteristic of

many types of reactors currently under study in the United States such as the pressurized water reactor (the type that Westinghouse built for the U. S. Government and is building for the AEC-Duquesne Light Company generating station at Shippingport, Pa.) boiling water reactors and homogeneous reactors that use a water moderator.

Dr. Henry went on to surmise that this unique characteristic of inherent stability might some day be used instead of metal control rods to control the output of nuclear power plants.

He said, "Instead of being forced to use relatively rare, expensive and hard to work control materials like hafnium metal to absorb extra neutrons, we may in the future be able to operate power reactors with *steam* control rods which get rid of the extra neutrons by letting them 'leak' out of the core. At present such an idea presents serious difficulties, but we are studying them and it appears that there is a good chance that we shall be able to solve the problems reasonably soon."

In reviewing the field of reactor kinetics for the atomic scientists, Dr. Henry first described how the kinetic behavior of a reactor can be used as a research tool to understand basic characteristics of any chain reacting system. By allowing scientists to measure basic characteristics, reactor kinetics gives them a method of checking theoretical calculations.

"Reactor kinetics," Dr. Henry explained, "is the study of how a reactor and its associated power plant behave in time. In plants where water is pumped through the reactor core to remove the

heat produced by fissioning there is a strong interaction between the temperature of the water and the criticality of the core. (A core in which a self-sustaining chain reaction is taking place is said to be critical.) This interaction occurs because the hydrogen in water prevents the neutrons produced by fission from 'leaking' out of the core and thus keeps them near the uranium when they will cause further fissions. Raising the temperature of this water causes it to expand so that more neutrons 'leak' out of the core and the chain reaction cannot be sustained. In reactor kinetics we develop equations which describe this situation and thus predict how the power of the nuclear core will change under a variety of conditions."

Dr. Henry also discussed how these kinetic properties can be applied to reactor design, both in accident studies and to extend design limitations. He said that by indicating potential improvements, reactor kinetics is helping advance the design of current power reactors and is supplying new ideas and information on how to control power reactors.

Dr. Henry started his studies of reactor kinetics in 1950 when he first joined the Bettis Plant, atomic power research laboratory that Westinghouse operates for the Atomic Energy Commission. His first assignment involved developing reactor kinetics equations for the power plant of the submarine Nautilus. When this project was completed, he was placed in charge of reactor theory and theoretical physics for the Submarine Fleet Reactor program at Bettis (which involves the design and development of four nuclear power plants for submarines.)

In his present assignment as manager of reactor physics applications, advanced development and planning group, Dr. Henry has a chance to study the application of reactor theory to improved reactor design.

Air Force Business Goes to Small Firms

A growing part of Air Force business is being given to small business firms having less than 500 employees, reports *Electronics*. Awards to small business in fiscal '55 totaled \$20 million more in prime contracts and purchase orders than in 1954, or \$576.8 million.

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WSE Personals

Edison Brock, LMWSE, is retiring from his position as a mechanical engineer with the Bureau of Engineering, City of Chicago. He became a member of the Western Society in 1920. Mr. and Mrs. Brock are going to California to live. They will thus be near their two sons, one a physician and the other an engineer with a Ph.D. degree.

* * *

James R. Davidson has been appointed executive secretary of the Society of Plastics Engineers, Inc., it was announced recently by Jerome Formo, president.

Davidson, formerly sales manager of Hoosier-Cardinal Company assumes his new duties July 1 in the National Office located in Greenwich, Conn.

SPE, with 5000 members in 35 geographical sections, is a rapidly growing engineering society which seeks to disseminate technical information on plastics. It does this through its national, regional, and local meetings as well as by publishing a journal and technical books.

* * *

Theodore Van Zelst, MWSE, has returned recently from a trip to South America where he visited his firm's sales representatives. Van Zelst is president of Soiltest, Inc., Chicago manufacturer of engineering test apparatus for soils, concrete, and asphalt.

While in Bogota, Colombia, he attended the formal opening of the new Ministry of Public Works Laboratory. In conjunction with the opening of the

laboratory, Van Zelst presented a short two-day course in field and laboratory testing to 75 Colombian engineers.

Rare Earth Elements Serve as Catalysts

Rare earth elements show great promise as catalysts in the production of high-octane gasoline and other petrochemicals, an international catalytic authority reported in Dallas, Tex. on April 12.

Dr. Vasili I. Komarewsky, professor of chemical engineering at Illinois Institute of Technology, Chicago, told the American Chemical Society national meeting of work being carried on at Illinois Tech under a Crane Co. research grant.

Komarewsky said that early results indicate that certain rare earth oxides can be used as catalysts in the dehydrogenation reactions that produce high-octane gasoline.

He said the studies show that rare earths may affect chemical reactions producing synthetic rubber and plastics. He also speculated that rare earth elements are to be important catalysts in many other reactions.

Komarewsky said that the research has shown that the oxides of two of the 15 rare earths—neodymium and samarium—are predominately catalysts and that cyclohexane can be dehydrogenated to benzene in the presence of these oxides at a temperature of 545°C.

He also reported that the paraffin hydrocarbons, normal heptane, and octane-1, can be dehydrogenated and cyclized at a temperature of 525°C, in the presence of pure neodymium and samarium oxides.

The deposition of neodymium and samarium oxides on alumina substantially improves their dehydrogenating properties, he added.

Komarewsky said that little systematic work has been done on the rare earth elements because they seldom occur in nature in the pure state.

"Because of recent developments in the production of titanium and because of activity of the Atomic Energy Commission, the rare earth elements are being transformed into common, readily available material," he declared.

"These elements are essential by-products of atomic piles, as well as being closely associated with the minerals that are the main natural source of titanium."

Catalysts — often described as the modern industrial version of the alchemist's touchstone—are substances which alter the speed or the nature of a chemical reaction without being changed themselves.

On the job, catalysts help industry by making desired chemical reactions occur more rapidly and produce higher yields of a purer product than they would without the catalyst. The petroleum refining industry is a large user of catalysts in its operations.

Public Utility

A new twist to the role of buses in public convenience was added by a janitor mopping the steps of a city department store, says *Bus Transportation*. As a bus approached, the janitor dashed to the curb and thrust his mop in front of the nearest wheel. Then, with the mop thoroughly wrung out, he went back to his job.

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Mexico Pushes Sulfur Production

For the first time in the history of the American sulfur industry, extending over a period of fifty-three years, American producers are facing major competition from Mexican Frasch sulfur producers, Seymour Schwartz, president of S. Schwartz & Associates, New York consulting engineers, stated May 24 in an address before the New York Section of the American Institute of Mining, Metallurgical, and Petroleum Engineers in the Mining Club.

Schwartz stated the Mexican industry is pursuing an aggressive course in the competition of the two countries, with price cuts on both sides. He pointed to "significant" imports by the United States "for the first time in 50 years." He emphasized that there has been a considerable drop in exports by American producers.

"At no time in the past has the American sulfur industry faced the problem of stiff competition except when it was born," said Schwartz. "For nowhere else in the world did the Frasch process exist except on the American Gulf coast. This picture has changed with the advent of Frasch sulfur production in Mexico.

"Because sulfur is used in almost everything we use, eat and wear, directly or indirectly, the impact of foreign competition on this basic commodity cannot be ignored.

"Sulfur production in Mexico has been growing like a house afire. Although production in 1954 in Mexico was only 86,000 tons, compared with about six million in the United States, last year's production in Mexico skyrocketed to about 516,000 tons. It is ex-

pected to reach 944,000 tons by the end of this year, 1,310,000 tons in 1957 and 1,605,000 tons in 1958.

"For the first time in 50 years, significant quantities of sulfur are reaching the United States. Last year, 31,000 tons were imported. This year the total is expected to reach 150,000 long tons, with 300,000 tons in 1957 and 500,000 tons in 1958. The last year that sulfur imports to the United States exceeded 31,000 tons was in 1906 when Herman Frasch put an end to the control of the sulfur industry by the Sicilian producers.

"The year 1954 will probably be remembered in sulfur history as the peak year for the American producers, when they exported 1,605,000 tons of sulfur. In 1955 approximately 1,300,000 were exported, and this year the figure may drop to below 1,000,000 tons. This impact is traceable to the aggressiveness of the Mexican producers who are willing to sell their product below the quoted price in exchange for long-term sales contracts.

"The head-on collision between the American and Mexican producers in the export market has brought price cuts on both sides. In the battle for one contract in the domestic market, the discount is understood to have been substantial. Further temporary reductions in price are in prospect until such time as sales of sulfur are readjusted among the various producers. Until the available slack in supply is taken up, or unless a synthetic stabilizing force is set up, competition will continue to be keen.

"The prospect of increased competition from Mexico is a dilemma for

American sulfur users for they must decide whether they should jump on the Mexican bandwagon, ride along with the home producer or do both."

In his discussion of the interests of the sulfur producers and consumers in Great Britain, Mexico and the United States, including the interests of the American investors, Schwartz stated that the attitude of the Mexican government toward the sulfur industry, when the Mexican position may be more dominant, "is the greatest unknown quantity in the entire sulfur picture. Just as one leading sulfur producer may have been thought of as the Sphinx of the sulfur industry, so may the Mexican government assume this role in the near future. It is expected, however, that the Government of Mexico will nurse and protect its nascent sulfur industry, so that excess competition will neither harm the industry nor unduly restrict the flow of benefits to Mexico."

In forecasting the outlook for the American and Mexican sulfur industry, Schwartz concluded that "peaceful co-existence through the efforts of the Mexican government and/or of the larger sulfur companies is possible and perhaps probable."

Industrial Expansion Is Conference Theme

"Resources for Industrial Expansion" will be the theme for the 1956 Western Area Development Conference next October 31 and November 1 at the Hotel Westward Ho, Phoenix.

Co-sponsor with Stanford Research Institute will be Confederacion de Camaras Industriales de los Estados Unidos Mexicanos, a Mexican industrial association.

Program emphasis will be placed on water, energy and other resources which are vital to the industrial growth of the West.

Tentative plans for the conference include a luncheon on the first day and a luncheon and a banquet on the second day.

Subjects to be discussed during the conference will include: energy, resource development, land and water development in northwest Mexico, water resources, saline water conversion, sewage reclamation, industrial water reuse, land economics, and industrial leadership in area development.

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Annual Meeting

(Continued from Page 17)

to you your new president, the chief engineer of the Illinois State Toll Highway Commission, Mr. George L. Jackson."

Mr. Jackson's remarks for this installation as president of the Western Society of Engineers follow:

"It has been my observation that the Annual Meeting is primarily the affair of the retiring president and I realize that it behooves to be as inconspicuous as possible.

"Let me express the fervent hope that the program and activities of Western Society of Engineers, in the last year and in the coming year, are not in direct ratio to the sizes of the respective Presidents.

"We live in a world of change and progress and man and his institutions inevitably change. Organizations change by growing deeper in purpose and more vigorous in action or they lose direction and benefit to anyone. They don't stand still.

"According to my search of the records, Mr. Boysen was the 77th President of the Society. The first President 87 years ago, Mr. Roswell B. Mason, could not telephone for a reservation for the Annual Meeting, and could not have motored to dinner and eaten by electric light, and could not have propelled his voice by a speaker system. I mention those major items of basic technical progress that have occurred during the life of the Society but I have no means of making a comparative appraisal of those cultural topics of wines, women and songs of that founding era and of today.

"Yes, Western Society has changed and if you must hurriedly refresh your memory, think of the 20 years in the Engineering Building and the years in the Monadnock Building before that. True enough, that is only physical move and expansion but I think also that — thanks to wise leadership — our Society has kept pace in spirit and in policy with the needs and problems of the engineering profession. In doing so it has made a beginning of what I think is its most important role — that of leading and serving the entire engineering profession in this Metropolitan Area in non-engineering activities. The engineer

today is finding it necessary to assist in matters that for too long he acknowledged no responsibility.

"The Society must become more effective in bringing the voice and opinion of the engineer to bear upon situations that merit his attention as a citizen. By this I certainly do not mean to infer that the path to that goal is by way of political effort.

"I do not know how other men have felt as they were about to occupy the office of President of the Western Society of Engineers. I cannot even remember what they said as you won't remember these remarks. However, I believe that none was more grateful for the opportunity to serve his Society or more appreciative of the confidence and respect of his fellow engineers.

"We have a long and reliable back sight and our foresight must be just as certain. I am not prepared to make any predictions or announce any plans except to issue warning to Section Executive Committees. The Sections are the basis of our present organization and as such should have more responsibility, particularly for the program and membership activities. A wave of resignations is not anticipated because of this view because I am sure everyone is ready and willing to do his part.

"With an able Board of Direction and a fine, experienced office staff headed by Mr. Harrington, it is possible to make up for a lot of presidential deficiencies. But I assure you that I will do my very best."

After Mr. Jackson finished his remarks, Mr. Boysen introduced Mr. Thomas H. Coulter, MWSE, the speaker of the evening. Mr. Coulter, chief executive officer of the Chicago Association of Commerce and Industry, had just returned from Israel where he served as a member of the United States Management Seminar Team. The title of his address was "Conditions in Israel as they are Today."

When Mr. Coulter concluded his address, Mr. Boysen adjourned the meeting.

High Strength

For most structural uses, such as trusses, beams and columns, wood is considered stronger pound for pound than structural steel, reports the National Lumber Manufacturers Association.

Ceramic Coatings Called Key Material

"Ceramic coatings will be a key material in the coming nuclear and supersonic era," Robert A. Weaver, Jr., president of the Bettinger Corporation, said May 24, speaking before a Management Conference session of the National Federation of Financial Analysts Societies meeting in Boston.

Weaver said that ceramic coatings can withstand temperatures and strains that often destroy metals. He pointed to the high temperature ceramic coating work which his company currently is doing on jet aircraft afterburners as an example of where ceramics were called in to do a job that metals could not perform satisfactorily. These same coatings can be used in innumerable other cases where heat and corrosion are destructive forces, he said.

Bettinger, he added, has been applying ceramic coatings to such units as turbosupercharger nozzle boxes, inter-combustion liners and afterburner interliners, exhaust and collector rings, truck mufflers, industrial furnace parts, parts trays used in heat treating, and nichrome elements. Another application doubled the life of annealing furnace tools that formerly needed replacement every thirty days.

In areas where radiation is a factor to be reckoned with, Weaver said that ceramic surfaces are easily decontaminated. This, he explained, is because ceramic coatings are inorganic, nonporous and hard surfaced.

Aside from the fields of science and aviation, ceramic coatings also are making great strides in the construction industry, he stated.

"Technological progress in the development of ceramic coatings, making it a light, permanent, color-fast building material has caused a great upsurge in its use in architectural curtain wall panels."

He said that a 2½ inch thick curtain wall panel developed by Bettinger is equal in insulation to a standard masonry wall of a thickness from 10 to 12 inches. Since the curtain wall is far lighter in weight, it requires a much less costly steel frame, can be installed more rapidly and needs no maintenance.

Obituaries

The Western Society of Engineers has recently been notified of the following deaths:

Carl R. Oldenburg, exchange plant engineer, Illinois Bell Telephone Company, died on May 26, 1956. Mr. Oldenburg became a member of the Western Society of Engineers in 1931. He had been an associate member before becoming a member.

* * *

Martin F. Carroll, the Western Society has just learned, died on January 10, 1956. Mr. Carroll had been president of Carroll Construction Company. He joined the Western Society in 1953. He had been especially interested in the Bridge and Structural Engineering Section of the Western Society.

* * *

Henry B. Hugon, an appraisal engineer, died January 7, 1956, the Western Society has just been informed. Mr. Hugon was self employed. He became a member of the Western Society of Engineers in 1948. He received his professional education at the Royal Academy, Montreal, Canada.

* * *

Ralph H. Rice, a member of the Western Society of Engineers since 1910, and a life member since 1940, died on May 26, 1956. At the time of his death Mr. Rice was retired. He was active in the Society, especially from 1938 to 1947 when he served on many committees. In 1909 Mr. Rice was awarded the Octave Chanute medal for a paper on electrical engineering.

* * *

George Y. Taylor, division operating superintendent, Public Service Company, division of Commonwealth Edison Company, died on April 25, 1956. Mr. Taylor had been a member of the Western Society of Engineers since 1952.

* * *

Vernon A. Peterson, a patent attorney and a partner in the international patent firm of Langner, Parry, Card and Langner, died on May 27, 1956. Mr. Peterson had been a member of the Western Society of Engineers since 1931. He was a trustee of the Illinois Institute of Technology.

MIDWEST ENGINEER

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Steel "Throat" Will Help to Test Planes

A stainless steel "throat" which will harness man-made winds up to 2,300 miles per hour, to test airplanes designed for supersonic speeds, was unveiled in Cleveland on May 22 by the National Advisory Committee for aeronautics.

The new "throat," constructed by U. S. Steel's American Bridge Division, is part of the wind tunnel at the new Lewis Flight Propulsion Laboratory of the NACA, the government's chief aeronautical research agency. By opening and closing the huge "throat," technicians can uniformly control the speed of air passing through the tunnel more precisely than ever before achieved.

Confronted with intolerable tolerances, strange equipment, rigid specifications, and special steels, all of the steel fabricator's tricks of the trade were called upon in making the "throat."

The stainless steel walls of the "throat" can be flexed while the tunnel is operating, thus providing continuous control of speeds. Air flow, which make hurricanes a baby's breath by comparison, are winds ranging from two to three and one-half times the speed of sound.

A special stainless steel—"Stainless W"—developed by U. S. Steel was selected for its good corrosion resistance, good workability and very high strength to withstand the tremendous stresses involved.

To eliminate joints which would interrupt air flow, specifications called for huge special stainless steel plates, largest ever to be rolled at U. S. Steel's Homestead Works. The precise machining, with thicknesses varying widely within one plate, necessitated moving this phase of the project to a machine shop with adequate heat treating, pressing and machine equipment to handle these mammoth plates. The great South Charleston, West Virginia, Naval Ordnance Plant, where armor plate is made during national emergencies, was reopened and operated by U. S. Steel crews.

Welding, too, was ticklish. Requirements necessitated constant visual checks, and completed work was subject to the most severe tests.

American Bridge also fabricated and erected several other vital parts of the

wind tunnel including the test section where jet engines, aircraft parts and high-speed missiles are studied; the second "throat" whose function is deceleration of air speed to conserve energy and economize on power requirements, and the installation of the jacks and other operating machinery for flexing the nozzle walls.

Some 722 tons of steel were involved.

Brazilian "Scraper" to Use Brazilian Steel

A 21-story office building recently begun in Sao Paulo will mark a milestone in Brazilian construction, according to *Engineering News-Record*. It will be the country's tallest steel-framed building and will be constructed with Brazil's own steel.

The building, which will be seven stories taller than its nearest competitor, will be made of steel supplied from a mill at Volta Redonda, which has now increased its production enough to satisfy Brazilian engineers' demands.

The new building will cost \$20,100,000, and will use 1,450 tons of structural steel (more than the 1,100-ton monthly output of Volta Redonda). Exclusive of the foundation, 3,900 cubic yards of concrete will be used. The building will rest on 22 reinforced concrete caissons sunk to a depth of about 65 feet.

To be finished in late 1958, the building will offer 258,000 square feet of floor space. The basement will be made into the biggest drug store in Brazil. Stores will occupy the first four floors, and 243 offices will occupy the tower section, the magazine reports.

Ozone Conference to Be Held in Chicago

Ten industrial companies and a chemical society have joined Armour Research Foundation of Illinois Institute of Technology in sponsoring the first International Ozone Conference in the United States.

The conference, scheduled for Nov. 28-30 at the Sheraton Hotel, Chicago, will be devoted to both applied and fundamental chemistry of ozone. Approximately 50 papers will be presented, some by eminent scientists from other nations.

Sponsors, in addition to the Foundation, are Aerojet-General Corp., Air Reduction Co., American Electroaire Co., E. I. Du Pont De Nemours and Co., Grace Chemical Research and Development Co., Groak Engineering Corp., Linde Air Products Co., Melco Products, Inc., Welsbach Corp., Westinghouse Electric Corp., and the Division of Industrial and Engineering Chemistry of the American Chemical Society.

Ozone, one of the most powerful oxidizing chemicals, has been a subject of research for more than 16 years at Armour Research Foundation.

A major purpose of the conference, according to Clark E. Thorp, conference chairman, will be consideration of industrial applications—current and potential—of ozone. Papers on the fundamental chemistry of ozone and its biological effects also will be presented.

Information concerning the conference can be obtained by writing Sidney Mittler, Armour Research Foundation, 10 West 35th St., Chicago 16, Ill.

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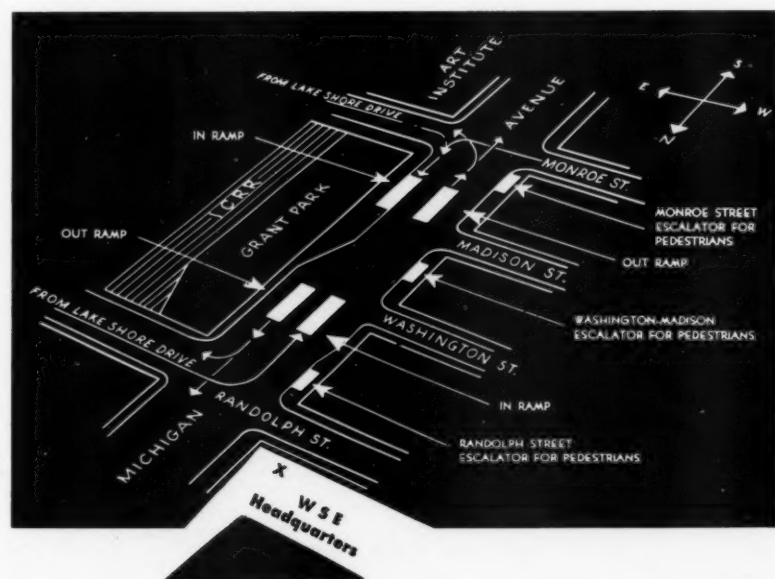
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Below: map showing Park Department Underground Garage



Interior view of Underground Garage

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